

Agricultural Greenhouse Gas Inventory Advisory Panel Meeting

12 November 2013

MPI, Pastoral House, meeting room 7.3

Minutes

Meeting start: 9:30

Attendees:

The Agricultural Greenhouse Gas Inventory Advisory Panel ('the Panel') comprises:

- Peter Ettema, Manager, Resource Information & Analysis, MPI
- Dr Andrea Brandon, Senior Analyst, MfE
- Dr Harry Clark, New Zealand Agricultural Greenhouse Gas Research Centre (NZMethanet)
- Prof Frank Kelliher, AgResearch (NZN2Onet)
- Dr Keith Lassey, Lassey Research and Education LTD (NZMethanet)
- Dr Andy Reisinger, New Zealand Agricultural Greenhouse Gas Research Centre (also for The Royal Society of New Zealand)
- Simon Wear, (Chair) Resource Information & Analysis, MPI

Other attendees included:

- Dr Mike Rollo, AgResearch
- Dr Nicki Stevens, Resource Information & Analysis, MPI

Administration was provided by Simon Wear, Resource Information and Analysis, MPI.

The purpose of the meeting was for Panel members to discuss and consider approving proposed changes to the Agricultural Greenhouse Gas (GHG) Inventory. The Panel's recommendations, of which changes were considered scientifically robust enough to implement, are provided to the Deputy Director-General, Policy. Two proposed changes were presented for an amended emission factor for urease inhibitors and to update the equation to partition nitrogen from excreta between dung and urine. A briefing paper, the report and a review were all submitted for each proposed change for discussion and agreement. Summaries of reports are found in the briefing papers.

2014 is the final year of reporting under the Kyoto Protocol first commitment period (2008-2012). After a true-up, the 2006 IPCC Good Practice Guidance will be used from the April 2015 submission (1990-2013 report) onwards. MPI plans to do a parallel run using both guidelines to look at the differences and for QA/QC of the changes. The 2006 guidelines have minor implications for methane emissions, but there are significant changes to nitrous oxide emissions, including; pasture renewal, nitrogen losses from mineralization, additional sources of nitrogen added to agricultural soils and changes to manure management classification.

Review of 2012 Panel Meeting Minutes

The minutes from the 2012 meeting were tabled. This inventory year was the first year that the VBA-based Inventory model was implemented. The modeling is much faster, more transparent, can be updated more easily and has improved the robustness of the data entry (due to reduction of manual data entry).

Two papers were discussed during the 2012 panel meeting: (1) EF₅ paper – the Panel had agreed to more work on the various components of indirect nitrous oxide emissions from leaching and runoff (EF₅) which is now in train. (2) The other agreed improvement was adoption of amendments to activity data and methodologies within the deer model.

The terms of reference were updated slightly during the 2012 Panel meeting.

Inventory Improvements from 2012 Panel Meeting

Recommended improvements for deer from the 2012 Panel meeting were implemented in the 2013 Inventory submission.

MPI has commissioned a review of New Zealand and international research on all sources of indirect N₂O emissions (EF₅), to recommend appropriate values for New Zealand for indirect emissions from rivers, ground-water and estuaries (EF_{5-r}, EF_{5-g} and EF_{5-e}).

Emus and ostriches (population approximately 2000 in NZ) are a non-mandatory activity and have been added into the poultry population to address encouragements from UNFCCC expert review teams (ERTs).

Annual expert review meeting UNFCCC

New Zealand has been advised by UNFCCC expert review teams (ERTs) that we need to apply country-specific emission factors and move away from default emission factors. However, as many country-specific emission factors are lower than defaults, New Zealand's methodologies have been questioned. On-going agriculture inventory research is therefore required to maintain New Zealand's sound science base for the agriculture inventory and to defend the greenhouse gas estimation methodologies.

An ERT reviewed New Zealand's inventory during the first week of September with initial questions (outlined below) arriving in late August. The response to the review questions was interrupted by an earthquake in Wellington and 2 planning days during the week of the review. Peter thanked Frank, Harry, Mike and Simon for the long hours they put into answering the ERT questions during the week of the review. The ERT draft report is due late 2013.

ERT questions included:

- How a weighted emission factor for young and old sheep is formed;
- Why the gross energy intake and enteric fermentation for NZ swine is low compared to other parties;
- How the droughts have affected emissions;
- Daily enteric fermentation estimates did not appear to upscale to annual enteric fermentation rates;
- How total milk statistics were derived, whether milk was lost (and perhaps not accounted for in the statistics) and how many days lactation;
- How volatile solids are estimated;
- Inconsistency in nitrogen in the Common Reporting Format (CRF) tables that led to the discovery that 56 dairy cows on the Chatham Islands that had not been accounted for;
- Lack of referencing to support the calculation of the partition of nitrogen in excreta between urine and dung (Harry confirmed original equation picked up from OVERSEER, originally not used until 3 years ago when the dung and urine emission factors were differentiated);
- How many field trials have there been on agricultural soils; and
- How were N₂O emissions from soils up-scaled to a national level accounting for different soil types.

The preliminary recommendations from the ERT were to:

- provide a better explanation of the low emissions from swine in the NIR,
- provide a source reference for partitioning nitrogen in excreta between dung and urine, and
- improve QC of final numbers (e.g. the nitrogen data).

Paper 1: Urease inhibitors (UIs)

Summary

The 2011 Panel recommended updating the existing data and uncertainty relating to $\text{Frac}_{\text{GASF}}$. Surinder Saggar (Landcare Research) has since published a paper (Saggar et al. 2013) which recommended a change for $\text{Frac}_{\text{GASF}}$ where UIs have been used.

Discussion

The Panel noted that some wording in the proposed change in $\text{Frac}_{\text{GASF}}$, based on the abstract in the Saggar et al. (2013) paper, may be misleading as the paper recommends a change to the value of $\text{Frac}_{\text{GASF}}$. The Panel suggested that the paper's recommendation should be to agree to an efficacy factor for UIs which is applied to $\text{Frac}_{\text{GASF}}$, while leaving the value of $\text{Frac}_{\text{GASF}}$ in the absence of UIs unchanged, since the scientific information submitted did not allow a review of the value of $\text{Frac}_{\text{GASF}}$ per se, but only the change in emissions where UIs have been applied. This would also have the advantage that uncertainties in $\text{Frac}_{\text{GASF}}$ and the efficacy factor remain independent and ensure that transparency is maintained for the reviewers.

Some changes to the panel paper were proposed:

- Paragraph 15: wording should be changed to match 2011 minutes – Panel did not agree to use the updated values but did agree to defer the decision on this recommendation until the 2012 Agricultural Inventory Panel meeting, at which time an updated, reviewed report with uncertainty analysis would be presented to the panel.
- the word 'notable' is to be changed to 'negligible'
- The table showing activity data to be deleted.

Actions

- The $\text{Frac}_{\text{GASF}}$ value should be multiplied by an efficacy scalar of 0.55 where UIs are applied – i.e. the value of $\text{Frac}_{\text{GASF}}$ does not change.
- Amendments to be made to the panel paper as discussed.
- Simon Wear to investigate why the activity data (provided by Ballance) for urease inhibitors, remains constant for several years with the data provider and will ensure emissions calculation and activity data are accurate prior to including in the inventory.

Decisions

As long as it is presented as a scalar (efficacy factor), the change is well-supported by the published paper and the Panel support the adoption of this change into the Inventory.

Paper 2: Partitioning nitrogen in excreta between dung and urine

Summary

It was identified during the recent ERT review that the current Inventory equation used for the partitioning of nitrogen in excreta was not referenced. AgResearch drew MPI's attention to Luo et al (2010) as an appropriate reference, which uses a slightly different equation (although the effect on estimated emissions is negligible). MPI proposed to update the inventory calculation and reference the 2010 paper in the 2014 and 2015 Inventories and commission further work to update the paper.

There was general agreement to this approach.

Discussion

The 2010 study is the best we have and is a good attempt using the current data.

The Panel discussed some of the difficulties of the on-going research and additional datasets that could be used. Some of the published papers for example provided values for nitrogen in urine, and it was not always clear whether these nitrogen values were estimated, or calculated within a model.

The on-going research will concentrate on analyzing data for sheep and provisionally check cattle data. If MPI require a peer-reviewed paper then it was recommended that the study doesn't mix livestock categories but the work could also be produced as a summary report with appendices for different livestock categories.

The Panel noted a problem for journal publishing that what may be relevant and of interest for the Inventory may not be suitable content for a journal paper.

Actions

- Revise the paper so that paragraph 19 refers to paragraph 9, delete reference in recommendations to accept an updated value if the variance was small (paragraph 20), and replace noticeable with negligible in paragraph 17.
- Provide consistent units in tables across papers in future so that they are comparable.

Decisions

The Panel supported the adoption of the N partitioning equation in Luo et al. (2010) into the Inventory.

Overview of research

Simon stated that he values this meeting as a good opportunity to receive feedback and advice from senior scientists on a wide-range of inventory topics. Several projects planned for 2014 were not ready in time for the Panel meeting as new (cross-government) procurement processes take effect.

Stocktake of some projects that didn't make it to the Panel this year

- Hill country implementation using Surinder Saggars' nutrient-transfer model and Beef + Lamb data had been delayed but is about to start.
- Indirect N₂O emissions from leaching and run-off (EF₅) could not start in early 2013 as hoped but is expected to be contracted during December 2013.
- Paul Muir's work on energy and nitrogen in pasture identified gaps in data for pasture quality in beef and sheep country and recommended a comprehensive sampling of pasture in beef and sheep country.
- Paul Muir's paper on nitrogen retention in liveweight gain, fibre and milk was not ready in time for the Panel meeting, primarily due to a lack of a reviewer.
- A report on sheep methane trials using the calorimeter at the Methane Research Centre has been drafted. New equations have been derived including a single equation for the effects of intake, age and pasture quality on CH₄ emissions. Dry matter intake remains the most significant factor. Best fit linear regression includes intake, age and digestibility ($r^2 = 0.9$).

Next year's projects

- Frac_{LEACH} review to include more field trials arising from Overseer to be completed by Plant and Food (Steve Thomas);
- Develop a simple pasture renewal implementation (Steve Thomas) ahead of switching to the 2006 IPCC guidelines for April 2015;
- External support to implement the 2006 IPCC guidelines to make sure all sources of emissions are covered, such as brewery and human waste etc, and to determine what is mandatory (Cecile de Klein AgResearch), and significant for New Zealand;
- Dung and urine paper as identified during the discussion above to change the partitioning on nitrogen in excreta between dung and urine;
- Trials on N₂O emissions from steep hill country and trials to account for seasonal variations in N₂O emissions;
- Pasture sampling in beef and sheep country as identified by Paul Muir's work; and

- Direct N₂O emissions from dairy shed effluent.

Other matters

- The methodology for effluent management is limited. Early in 2014, MPI intend to host a facilitated workshop to understand what activity data we have and then determine what is required to meet the reporting requirements. There are regional differences in effluent management practices and performance that will also need to be considered. Researchers from Massey who are doing trials on methane emissions from ponds will be invited.
- Procurement process – larger projects procurement plan has been signed off. Possibly more scrutiny in future years around value-for-money for deliverables. Procurement processes have been standardized across Government and made more transparent. A longer lead time to start projects is therefore required. A Methanet/N₂O meeting was suggested for December 2013, earlier than previous years, to facilitate procurement for the 2014/2015 year.
- Frank: meta-analysis of N₂O EFs – sheep urine and urea fertilizers – will have quite substantial implications for changes (reductions in emissions) in the inventory and whether fertiliser industry becomes involved in trials. Includes approximately 20 fertiliser trials. This could be a paper for next year's Panel meeting. Sheep urine analysis could feed into hill country work. Urea fertiliser is all flat land based. Frank is working on a transport model for nutrient transport from urine to soil, anaerobic versus aerobic processes. Results show EF1 for nitrogen from urea and sheep urine could be as low as 0.005 (0.5%)
- Dairy regionalization and whether to aggregate some of the dairy regions – Gisborne (into the Hawkes Bay) and Nelson/Tasman. Not much dairy in these areas which can cause spikes in milk yield data due to small variations in two different data sets.
- Negative nitrogen outputs for very young animals occurs in the equations for some livestock because the model uses life averages. This problem needs clear explanations around the assumptions about the activity data or by changing the growth rates across a lifetime. The negative values could be replaced with a lower limit such as zero, however this would lose the internal mathematical consistency of the model, because over the lifecycle of the animal the nitrogen is fully accounted for. These were flagged during a QA/QC review by Deloitte, but have been observed previously by inventory practitioners and understood.
- The peer review form "*Approval for change to emission factor, parameter or methodology*" was tabled as a review template for the Panel to consider. The panel supported the continued use of the reviewer template.
- MPI asked should a paper be reviewed for inclusion in the Inventory if it has been peer-reviewed in a journal. The Panel agreed that it should be because the review is for a different reason and needs to be reviewed by someone who understands the needs of the Inventory.
- The question of what level of documentation should be sufficient in the national inventory report (NIR). The NIR is intended to be a summary document and the greater detail could be reported in a separate methodology document. Some parties NIRs are very thorough with all equations laid out however sometimes too much information is provided making it difficult to find the key information. The Panel considered the question to be a policy question for MPI as it should be based on the requirements of the ERT. MPI noted that New Zealand does push back on excessive requests for details in the NIR such details are better reported in the separate detailed methodology document.